

Surgical Planing of the Skin

Dichloro-tetrafluoro-ethane as a Freezing Agent

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SURGICAL PLANING (dermal abrasion) is a surgical procedure for the treatment of scarring due to acne, chickenpox, smallpox and trauma; multiple senile keratoses (sailor's or farmer's skin); fine wrinkling; and traumatic tattoos.

In 1953 Kurtin⁶ was the first to report a large series of patients upon whom ethyl chloride was used to render the skin rigid and locally anesthetized while abrasion with a motor-driven wire brush was carried out. Since that time there have been many enthusiastic articles on this subject. Since some disadvantages have been observed with the use of ethyl chloride, the authors have employed dichlorotetrafluoro-ethane as a freezing agent.

Planing is usually done as an office procedure, with an analgesic given before operation is begun. Meperidine hydrochloride (Demerol®), 75 to 100 mg., is satisfactory for this purpose. When an evaporative refrigerant is to be used for local anesthesia, refrigerated "pre-chilling" packs containing 5 per cent propylene glycol in water are applied for 15 to 20 minutes to reduce the stinging sensation caused by the initial application of the refrigerant. The areas to be treated are then scrubbed with gauze wetted with 70 per cent alcohol or an equivalent antiseptic. Gentian violet may be applied to sharply delineate the areas to be planed and to indicate to the operator that he has or has not planed to the level of the floor of pits. The procedure is accomplished in segments of about three inches in diameter. First a segment is sprayed with a liquid freezing agent, dichlorotetrafluoro-ethane¹⁰ (Freon 114® or Frigiderm®) which renders the skin area temporarily rigid and locally anesthetized, and provides a bloodless field during the planing. The skin is then abraded with a rotating, stainless steel wire brush or diamond chip fraise attached to a flexible cable from a motor whose speed is controlled by a foot rheostat. The freezing agent can be delivered from a separate spray-top container similar to that used for insecticides^{1,10} or supplied from a container mounted on the motor standard through a small tube parallel to

• Surgical skin planing is, in the hands of an experienced operator, a safe and highly effective procedure for treating a number of cutaneous defects, most notably pitted acne scars.

The operation is facilitated by the use of a new instrument (jet-spray handpiece) which allows the operator to freeze the skin and plane it almost simultaneously, and by a new freezing agent, dichlorotetrafluoro-ethane, which adds to the safety by eliminating the old hazards of inflammability, explosion, and the toxic inhalation of ethyl chloride.

The ability to sharply differentiate between keloid and hypertrophic scar is fundamental to surgical skin planing. A hypertrophic scar results from the removal or destruction of the cutaneous appendages (hair follicles, oil and sweat glands and ducts); whereas a keloid is an idiosyncratic response without regard to damage of the appendages.

Properly performed surgical planing does not entirely remove these appendages and therefore healing occurs without scarring.

the flexible shaft and delivered close to the revolving brush through a spray-forming tip attached to the handpiece ("jet-spray handpiece"). The refrigerant is usually applied for about 10 to 30 seconds, and its effects last for 30 to 40 seconds.⁹ The brush rotates up to 15,000 revolutions per minute at full speed, and the one most commonly used is approximately $\frac{3}{4}$ inch in diameter and $\frac{1}{8}$ inch in width. Motion of the hand in which the brush is held is always kept at right angles to the plane of the brush, for motion in the other direction might result in grooving. The entire area is planed by a succession of adjacent parallel linear strokes. This procedure is then repeated, crosshatching at an angle of about 30 degrees with the original strokes to obtain maximum evenness, and attention is given to the blending of adjacent segments. The depth of planing is diminished at peripheral margins—"feathered"—to prevent sharp demarcations.

Rubber gloves are of value for protection against the cold as well as for asepsis. Applying tension to the skin with the thumb and fingers of the hand not manipulating the instrument renders the operative area flat and tensed. Wearing a thin sterile cotton glove on the hand used for tension (Figure 1) helps

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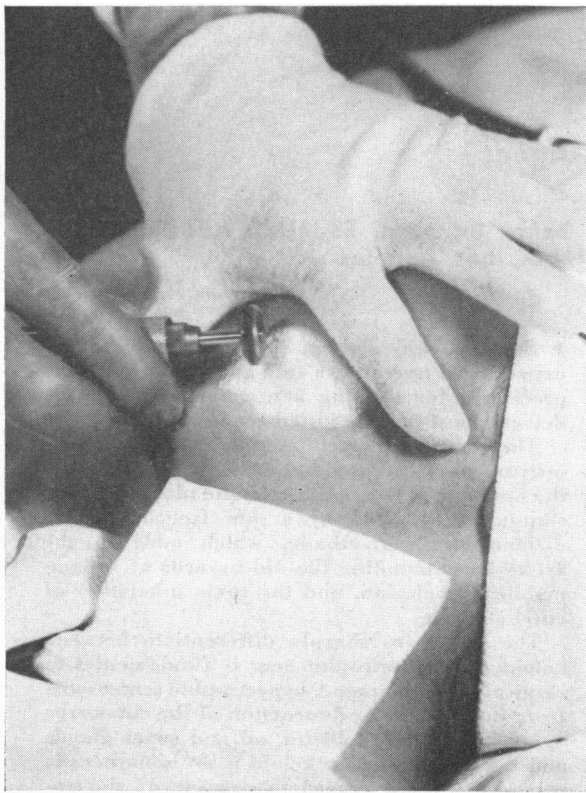


Figure 1.—Frozen area ready to be planed, using conventional handpiece. Note that rigidity produced by freezing is reinforced by skin being held taut by operator's left thumb and forefinger, aided by cotton glove.

overcome the occasional difficulty of slipperiness caused by blood and serum oozing from adjacent previously planed areas.² If gauze sponges are used for this purpose, they frequently become entangled in the revolving brush, causing "gouging" into the skin and often breaking the flexible shaft.

If indicated, the entire face may be treated at one session of 20 to 30 minutes. The process is moderately uncomfortable to the patient, but not painful.

Sterile gauze is then applied for about 30 minutes while the diffuse capillary bleeding stops. A nonadherent dressing,⁷ Telfa,[®] is finally applied which the patient is instructed to remove the next day. After removal of this dressing there is some serous oozing for several hours, but blotting occasionally with sterile gauze is all that is necessary. A crust promptly forms and separates in about one week. The initial erythema fades gradually in about three to eight weeks to match the adjacent skin. The average case of moderately severe acne scarring requires two planings, some only one, and severe cases may need three or more. The procedure may be repeated anytime after four to six weeks. It is worthy of emphasis that the new skin has a normal appearance and consistency, because it possesses the orifices (pores) of the original cutaneous appendages; whereas a scar



Figure 2.—*Left:* Pitted acne scars on left cheek before surgical planing. *Right:* After two planings.

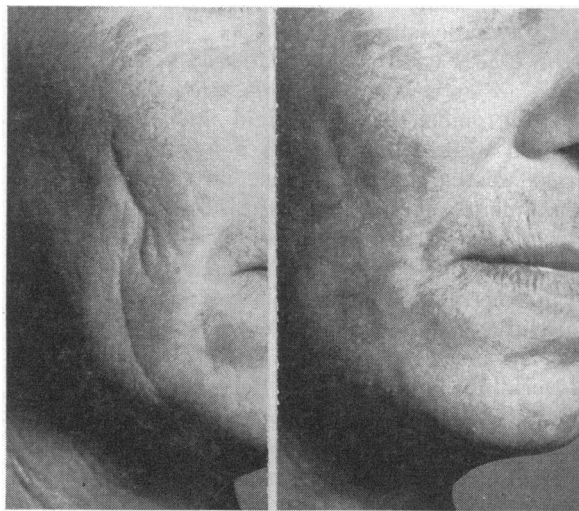


Figure 3.—*Left:* Linear traumatic scars on right cheek before surgical planing. *Right:* After single planing.

of any thickness has a glazed look chiefly due to the absence of sweat pores and pilosebaceous openings. In most cases the results are good to excellent, and in nearly all cases in which planing is indicated it can be helpful.³

In microscopic studies it has been observed that the scarred epidermis and upper dermis are removed to approximately the level of the junction of the sebaceous gland duct and the hair follicle. The new epidermis can be seen to be regenerating in three days from the myriads of cutaneous adnexa (pilosebaceous units) left behind. Clearly, skin with adequate cutaneous adnexa can regenerate quickly without scarring after planing when the deeper portions of these structures are still present and not destroyed. An x-ray burn or deep thermal burn produces atrophic or hypertrophic scarring due to destruction of the adnexa.

Contraindications to planing are the absence of the cutaneous adnexa, as in the above-mentioned conditions, and insufficient scarring to warrant the procedure.³

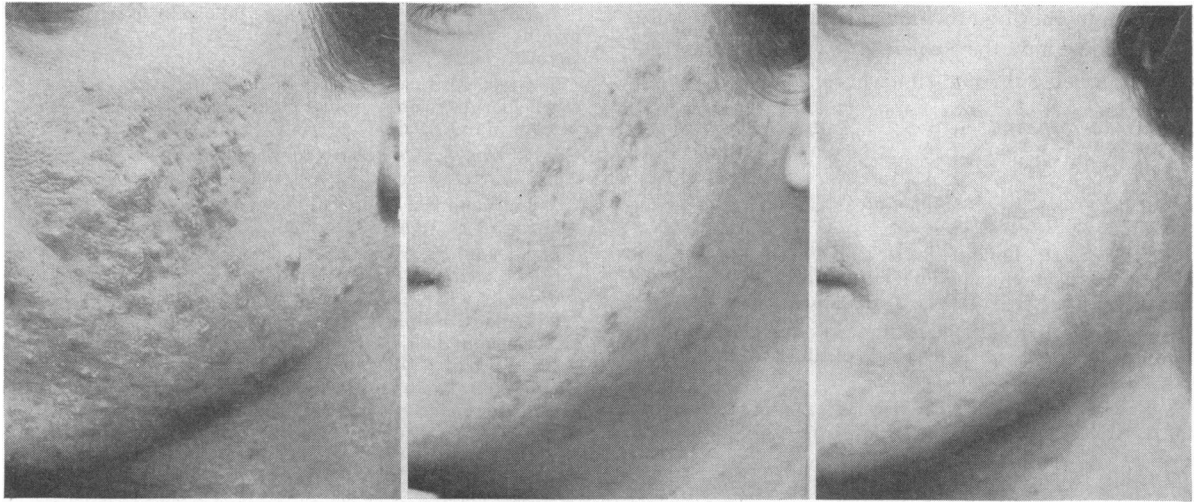


Figure 4.—*Left:* Severe acne vulgaris with scarring before acne therapy. *Center:* After acne therapy, but before surgical planing. *Right:* After first planing.

Complications thus far reported have not been serious.⁴ Bacterial infection is uncommon and is easily dealt with, preferably by an orally administered antibiotic of the type unlikely to cause a cutaneous reaction, such as one of the tetracyclines or erythromycin. Milia are the commonest postoperative problem. They can be easily removed by simple incision and expression. Prolonged erythema is rare and invariably fades eventually. Transient hyperpigmentation is usually the result of premature exposure to the sun. Transient depigmentation is more often seen in persons of racially darker skin or suntanned skin. It usually disappears satisfactorily in four to ten weeks. There is at present insufficient data available to permit conclusions regarding the possibility of persistent hyperpigmentation or depigmentation in dark skinned persons.

Hypertrophic scars are rare and are apparently the result of absence of cutaneous adnexa in an area at the time of operation, or removal of them by the depth of planing.

Keloid (which has not been reported to have occurred with surgical planing of the face) is not to be confused with a hypertrophic scar. A keloid is a dense fibrous response of injured skin where the injury does not necessarily destroy the cutaneous adnexa, as in an incision. Keloids, which occur most frequently on the posterior portion of the neck and presternal areas, and rarely on the face, appear to be due to idiosyncratic diathesis. A hypertrophic scar occurs in areas where the cutaneous appendages have been destroyed and healing must therefore take place by granulation and epidermal bridging from the margins of the wound.

Surgical planing with a rotary wire brush and/or burr has several advantages over abrasion with sandpaper: Hospitalization and general anesthesia

are not required; the small wire brush follows intricate facial contours better; and there is no danger of silica granulomas.

Ethyl chloride has been in common use for local anesthesia during the planing procedure. Grais⁵ noted in this regard that inhalation of the fumes may be a major disadvantage, for abrupt general anesthesia may be brought about inadvertently. One such alarming experience including temporary cessation of respiration was brought to the authors' attention. Other disadvantages of ethyl chloride are that it is inflammable and explosive in certain concentrations; it causes irritation of mucous membranes, and a blower⁶ or stream of compressed air⁸ is required as an additional piece of apparatus to produce adequate freezing when used for that purpose.

The refrigerant-anesthetic, dichlorotetrafluoroethane, which the authors have introduced for use in surgical planing^{1,9,10} has several distinct advantages. In contrast to ethyl chloride, it is nontoxic, has no general anesthetic properties, is noninflammable, and nonexplosive.

Surgical planing is an integral part of the proper treatment of severe scarring acne. It is the final correction of the ravishes of this disease, just as plastic operative treatment is often a basic part of the repair of the defects caused by lacerations or severe burns.

The psychologic depression and limitations of persons with unsightly facial scars is only really appreciated by observing the changes that occur in their attitudes and pursuits after correction of the scarring.

Reports of undesirable results are to date singularly absent from the literature. The future of the newly formed skin would appear excellent if one but recall the similar abrasions of knees on repeated

occasions in childhood while learning to roller skate, and examine now the healed skin without scar and free of sequelae through the years.

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